buch der Astronomie" on stellar photometry, spectroscopy, and chronology, he published a treatise on the determination of geographical positions for the use of travellers and explorers which was favourably received. His periodical compilation on the current history of astronomy has proved itself so useful and important that it is to be hoped it will be continued by some other hand. As a teacher of astronomy he is acknowledged to have been very successful. His presentation of the most recondite subjects was masterly and edifying, arresting and retaining the attention of his class.

NOTES.

THE list of honours conferred by the King on the occasion of His Majesty's birthday, November 9, includes the name of Prof. G. H. Darwin, F.R.S., who has been appointed a Knight Commander of the Order of the Bath (K.C.B.). Dr. W. Saunders, director of the experimental farms of the Canadian Department of Agriculture, and Dr. M. A. Ruffer, president of the Egyptian Sanitary Board, have been made Companions of the Order of St. Michael and St. George (C.M.G.). Sir Felix Semon has been appointed Knight Commander of the Royal Victorian Order, and the honour of knighthood has been conferred on Mr. Arthur Chance, president of the Royal College of Surgeons in Ireland, and Prof. McFadyean, principal of the Royal Veterinary College, Camden Town.

THE death of Prof. Albert von Kölliker on November 2, at eighty-eight years of age, has deprived the scientific world of one of the founders of modern systematic histology, and the eldest of the illustrious teachers and investigators in the realms of embryology and comparative anatomy. An outline of his scientific work was given in NATURE of May 5, 1898 (vol. lviii. p. 1), as a contribution to our series of Scientific Worthies; but his memoirs and other writings are so numerous that no adequate description of them can be contained within the limits of a short article. In the course of that appreciative notice, it was pointed out that von Kölliker was one of the first to realise that the complete justification of the cell-theory must be accomplished by a study of the whole history of animal tissues, from the fertilised egg onwards; and his papers on the development of Cephalopods (1844) and of Amphibia (1846–7) represent the first results of this conviction. Von Kölliker went to Würzburg in 1847 as professor of human anatomy, and almost immediately joined von Siebold in founding the *Zeitschrift für wissenschaftliche Zoologie*, to the early numbers of which he contributed a series of important papers. In the article already referred to mention was made of the considerable series of embryological and other papers, and of the masterly text-books, of which he was the author. In 1896, as a recognition of his brilliant scientific services, he was nominated a Knight of the order *pour le mérite*. He was elected a foreign member of the Royal Society in 1860, and received the Copley medal of the society.

DR. CHARLES WALDSTEIN has been created by the King of Denmark a Knight of the Royal Danish Order the Danebrog.

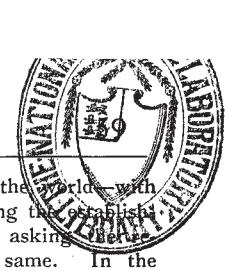
THE *Athenaeum* announces the death, in his seventy-fifth year, of Dr. Johann Meidinger, professor of physics at the Technical Institute in Karlsruhe, and author of a number of works dealing with the practical side of his subject.

THE superintendent of Commercial Agencies in Canada has expressed his conviction, says the *Journal of the Society of Arts*, that the establishment of a service of commercial agents to reside in British possessions for the purpose of reporting to the Commercial Intelligence Branch of the Board of Trade in London would be of immense benefit to the Empire at large. Such agents should report on all matters concerning the resources, growth, local enterprises, public contracts, openings for trade, and the investments for capital, as is done by His Majesty's consular officers and commercial *attachés* in regard to foreign countries. The superintendent adds that there is not in the whole of Canada a British official who can answer questions of the British exporter concerning Canada, while the Americans "have in the neighbourhood 190 officials."

AT a meeting of the Incorporated Society of Medical Officers of Health on November 10, Dr. Christopher Childs read a paper on a comparative study of the Lincoln, Maidstone, and Worthing epidemics of typhoid fever. After discussing the features presented by these epidemics, Dr. Childs advocated the retention of a staff of experts specially to investigate, at the earliest opportunity, similar outbreaks in the future, such a staff to consist of specially trained medical officers, bacteriologist, chemist, and sanitary inspectors, and organised by an epidemiologist of repute. Moreover, Dr. Childs advocated that in cases where water authorities refuse to listen to the repeated warnings of the medical officer of health with regard to the dangerous character of a water supply, the Local Government Board should take action to cause those authorities to take the best practicable means for removing the dangers to which attention has been directed.

AT the opening meeting of the new session of the Institution of Civil Engineers on November 9, the new president, Mr. John Gavey, C.B., gave an address in which he reviewed the progress of the telegraph and telephone industries during recent years. As illustrating the growth of telegraph and telephone accommodation provided by the Post Office, Mr. Gavey remarked that the telegraph wire mileage increased from 114,242 at March 31, 1880, to 338,120 at March 31, 1905. The telephone wire mileage rose during the same period from 40 to 253,521. There appears to be little prospect of serious competition between telephony and telegraphy after a certain critical distance has been reached. The determination of the distance over which telephonic speech is possible on various types of telephone circuit is a question of the greatest theoretical and practical interest. Telephone administrations have carefully considered what are the extreme limits of effective commercial speech, taking all the facts into consideration, and allowing a large margin of safety, and it is generally considered that from 42 to 46 miles of the English standard cable is the effective commercial limit. As to wireless telegraphy, the opinion was expressed that it is not likely to supplant, or even to compete seriously with, inland methods of communication; nor does it appear probable that it will, at least in the near future, actively compete with highly developed cable communication, although it may supplement that service. In submarine cable work the same progress may be noted as in other branches of telegraphy, the mileage of cable having increased from 87 nautical miles in 1852 to 212,894 miles in 1902, while it is still increasing. The problem of devising submarine cables for long-distance telephones has yet to be solved.

AN official guide to the Victoria Falls, compiled by Mr. F. W. Sykes, the conservator, has been published by the Argus Publishing Co., Ltd., of Bulawayo, at 1s. The guide has been compiled for the use of visitors, and is interesting throughout. On November 17, 1855, that is,



exactly fifty years ago, the falls were discovered by Livingstone. The native (Sekololo) name for the falls is "Mosi-oa-tunya," meaning "the smoke which sounds." Viewed from any of the surrounding hills, the rising columns of spray, more particularly on a dull day, bear an extraordinary resemblance to the smoke of a distant veldt fire. At sunrise, during the rainy season, a dense white column mounts upwards to a height of 1000 feet, which is visible at a distance of fifty miles from the falls. After a clear description of the places of interest in the neighbourhood of the falls, the book provides geological notes written by Mr. G. W. Lamplugh, F.R.S., botanical notes by Mr. C. E. F. Allen, ornithological notes by Mr. W. L. Sclater, and hints and cautions to visitors.

Two letters from Captain Amundsen, of the Norwegian vessel *Gjöa*, giving the earliest results of his expedition to the north magnetic pole, are published in Tuesday's *Times* (November 14). Captain Amundsen sailed in May, 1903, for Godhavn, on Disko Island, off the coast of Greenland. In the course of his first letter, dated November 24, 1904, he remarks:—February turned out the coldest month, with an average temperature of −40°·5 C. Commenced on March 1, 1904, putting down the stores for the coming spring voyage to the vicinity of the pole. Observed during this tour—in the interior of the country—our lowest temperature, −61°·7 C. Came back at the end of May. The summer I have spent in magnetic observations around the station. Wiik has put up the variation instruments—October, 1903—and has attended to them the whole time. Ristvedt is the meteorologist. Lieut. Hansen has to take care of the astronomical observations. Lund and Hansen have their hands full on board. The variation instruments will be kept in function until June 1, 1905. Besides the variation instruments, which have been in continual function, we also have made daily absolute observations. Along with the meteorological observations, we have also made observations of the aurora borealis. Besides we have ample collections of ornithological, ethnographical, and botanical matter, and some fossils. It is my intention to make my way out of the ice and go direct to San Francisco in the autumn of 1905. I will not omit to mention that the variation on the spot varies between N. 10° W. and N. 10° E. We have even found greater deviations. Most frequently it is about 5° W. The inclination is about 89° 20′. Captain Amundsen's second letter is dated May 22, 1905. In it he remarks:—This winter has not by far been so hard as the former. The sea-ice, which last year about this time measured about 380 cm., now is no more than about 170 cm. The lowest temperature we had in February, −45°. I commenced in February to circle the magnetic station, and have just finished this task. The magnetic variation house has been in uninterrupted activity. Absolute magnetic observations have been made daily, and at all temperatures. The meteorological registering instruments have been in function all the time. The zoological and ethnographical collections are constantly increasing. The magnetic variation house will be pulled down in the beginning of June, after nineteen months of uninterrupted activity.

IN an article in the current number of the *Fortnightly Review* the Marchese Raffaele Cappelli sketches the growth of the ideas which led to the recent international conference on agriculture held, at the initiative of the King of Italy, at Rome. He enumerates also the advantages likely to accrue from the International Institute of Agriculture created on that occasion. At the close of the conference referred to, a protocol was signed by the representatives of all the Governments of the world—with the exception of some minor ones—favouring the establishment of the International Institute, and asking their respective Governments to adhere to the same. In the opinion of the writer of the article, the institute must aim at regularising, promoting, and generalising its internationalism. It must provide for the rapid and general diffusion of knowledge of technical improvements in the economics of production. The institute must further undertake the task of coordinating the efforts of many cooperatives scattered throughout the world, so that they may act in harmonious agreement. But most important of all will be the services which the international corporation will be able to render in the field of the economics of distribution. When once the institute is in full working order, it will be able to give an approximate idea of the stock in hand of each kind of produce, and so provide farmers with a trustworthy guide as to which crops they will be able to cultivate to the best advantage in a given year. The Marchese Raffaele Cappelli, in the course of his inaugural address as president of the International Congress of Agriculture held in Rome during 1903, adumbrated the present tendency towards international dealings in agriculture, and he is to be congratulated upon the successful inauguration of an institute which will realise the ends he has advocated.

WE have received the second part of vol. lxi., and the first part of vol. lxii., of the *Verhandlungen* of the Natural History Society of Rhenish Prussia, Westphalia, and Osnabruck. Three papers, respectively by Dr. Krusch, G. Müller, and H. Westermann, are devoted to points connected with the coal-fields of Rhenish Westphalia and other districts coming within the purview of the society. Zoology is represented by a paper on the migrations of fresh-water planarian worms in the streams of the district, in which the author, Prof. W. Voight, distinguishes between the migrations of individuals and of species, and further subdivides the former class into accidental and periodical movements. In botany, Mr. F. Wirtgen descants on rare and disappearing plants of the Rhenish flora.

TO the October number of the *Quarterly Journal of Microscopical Science* Dr. H. W. M. Tims contributes a suggestive paper on the development, structure, and morphology of the scales in certain bony fishes. Such a study, the author suggests, may not only throw light on the relationships of fishes, but it may also help to solve many problems in connection with the development of tooth-germs, for there seems little reason to doubt that scales and teeth are homologous. The question whether scales are ever replaced is raised in the course of the communication. Among the other contents of the same issue reference may be made to a paper by Mr. H. L. Kesteven on the developmental stages represented by the embryonic shell, or protoconch, of the gastropod molluscs.

IN the October issue of the *Quarterly Journal of Microscopical Science* Messrs. Assheton and Stevens describe the minute structure of the placenta of an elephant belonging to Messrs. Sanger which in 1902 gave birth to a calf in the Zoological Society's Gardens. The duration of pregnancy appears to have been no less than twenty-eight months, although this is not absolutely certain. By an unfortunate error in Sir William Flower's article "Mammalia" in the ninth edition of the "Encyclopædia Britannica" (perpetuated in Flower and Lydekker's "Study of Mammals"), the proboscidean placenta is said to be non-deciduate. The deciduate character of the zonary

portion is, however, re-affirmed by the authors of the paper before us. On the other hand, the zonary placenta of the Sirenia is regarded as differentiated from the proboscidean type by being mainly, if not entirely, non-deciduate, although it is admitted that the two resemble one another in the long villi, which tend to remain in the walls of the uterus. Again, the resemblance of the proboscidean placenta to that of the Carnivora is deemed to be superficial, there being several important points of difference, the former having three areas of attachment in place of one. Another paper on development, by Dr. F. H. A. Marshall, deals with the mode of formation of the corpus luteum in various mammals.

IN the *Proceedings of the Boston Society of Natural History* (vol. xxxiii., No. 7) Mr. A. H. Clarke gives a descriptive list of birds collected in the southern Lesser Antilles. Fishes collected in Tahiti form the subject of a paper by Messrs. Jordan and Snyder in the *Proceedings of the U.S. Nat. Museum* (No. 1422), a new species of Holocentrus being described and figured. In two other communications, Mr. C. H. Eigenmann discusses the phenomena of divergence and convergence in fishes (*Biol. Bulletin*, vol. viii., pp. 59 *et seq.*), and contributes a preliminary note on the fishes of Panama as considered from the standpoint of geographical distribution (*Science*, ser. ii., vol. xxii., pp. 18–20). As regards the first paper, the members of the American family Characinidæ present examples of both divergence and convergence, some forms being differentiated for carnivorous and others for herbivorous habits, while yet others approximate to fishes of quite different families. In the second paper it is concluded from the evidence of the fresh-water fishes that the Pacific slope fauna of tropical America was derived from that of the Atlantic slope subsequent to the shutting-off of a water-way between the Atlantic and Pacific Oceans.

IN *Agricultural News* (September 23) reference is made to a memorandum written by Mr. M. Hesketh Bell, Officiating Governor of the Leeward Islands, on the occurrence of hurricanes in the West Indies. Mr. Bell points out that hurricanes do not occur in the West Indies so frequently as is generally believed, and that the accounts have in some instances exaggerated the amount of damage; further, he suggests that a scheme of insurance might be formulated which would offer great advantages to the landowners and at the same time prove acceptable to the underwriters.

THE Bulletin of the Department of Agriculture, Jamaica, for September, contains an account of the discussion on cocoa cultivation which took place at the agricultural conference held in Trinidad, also notes on the fungoid and insect pests of cotton. The pests reported by the Hon. T. H. Sharp and Mr. S. Stricker include the cotton worm, which can be successfully treated when quite young with Paris green; cut worms, which attacked the roots, but also yielded to treatment with Paris green; and the cercospora fungus.

THE report on the experimental agricultural work carried on in St. Kitts during the year 1903–4 has been published separately from the report on the botanic station. The superintendent, Mr. F. R. Shepherd, writes hopefully of the cotton industry and of the peculiar method generally adopted of growing the cotton as a catch crop on cane lands. Cotton seed was planted in May and June, and, after the first picking, the bushes were pulled up and sugar canes were planted. In the trials with varieties of sweet potatoes and yams, the very large differences between the yields of the better and poorer sorts furnish ample proof of the value of comparisons based on practical experiments to guide the cultivator in his choice of the best varieties.

DR. E. B. COPELAND has compiled a list of ferns belonging to the Polypodiaceæ recorded for the Philippine Islands, which is published in Publication No. 29 of the Bureau of Government Laboratories, Manila. The families are in accord with the "Pflanzenfamilien," but the sub-family Gymnogrammineæ is placed under the Asplenieæ. Of the sixty-two genera represented, naturally the largest is Polypodium, which is subdivided into six subgenera; a subgenus, Myrmecophila, is established for *Polypodium sinuosum* and *Polypodium lomarioides*, and this is followed by Drynariopsis, containing the species *P. heracleum* and *P. meyenianum*. Two species of the myrmecophilous genus Lecanopteris occur, and three species of Drynaria, a genus which is characterised by having pocket-leaves that collect detritus. In the same volume Dr. Copeland gives a selection of about twenty fungi for the islands, principally species of Coprinus, Phalliota, and Lepiota, which are said to be palatable and harmless.

WE have received the first number of *Gas and Oil Power*, a new illustrated monthly review for factory owners and other power users. It contains an exhaustive article on the construction of internal combustion engines by Mr. R. E. Mathot, and a special table of the cost of power and light in the principal towns in England.

IT has long been recognised that a wide field of profitable work has been opened for motors in connection with British railways. The earliest steam motor seen on a British railway began regular working in June, 1903, on the Fratton and Southsea line of the London and South Western Railway. It was designed by Mr. Dugald Drummond, and proved so successful that numerous other rail motor services have been introduced or sanctioned, for which an improved type of motor has been designed by Mr. Drummond. It seats eight first-class passengers and thirty-two third-class passengers. The total length of the car is 51 feet 2½ inches, and it may be driven from either end. When empty the vehicle weighs 31 tons 11 cwt.

THE annual progress report of the Geological Survey of Western Australia shows that in 1904, under the able direction of Mr. A. Gibb Maitland, much valuable work has been done in investigating the mineral resources of the colony. An examination was made of the Pilbara, Mount Morgans, Southern Cross, and Norseman goldfields. The occurrence of telluride ore, petzite, at Mulgabble, and of precious opal at Coolgardie was reported upon favourably, and the reputed tin finds at Cuballing and of petroleum on the Warren and Donnelly rivers were investigated. Analyses were made of manganotantalite from the Pilbara district, of scheelite from the Nullagine district, and of cobaltiferous asbolite, of no commercial value, from Greenbushes.

EXCELLENT work is being done by the mines branch of the Canadian Government under the direction of Mr. E. Haanel, the latest departure being the inauguration of a series of monographs on the economic minerals of Canada. The first of the series, which has just been received, has been written by Mr. F. Cirkel, and deals with the occurrence, exploitation, and uses of mica. It forms a handsome volume of 148 pages, and is accompanied by a coloured geological map of the mica region of Ontario. It contains a synopsis of all the available practical inform-

ation on mica, and should lead to the development of the large mica tracts now known only by name, and to a search for the mineral in other parts of the Dominion. At the present time only a small proportion of the Canadian deposits are worked, many promising deposits having been abandoned on account of lack of experience on the part of those who directed the operations. In 1902 the value of the world's production of mica, in dollars, was as follows:—India, 507,770; Canada, 242,310; United States, 98,859; Brazil and other countries, 55,200; total, 904,139.

IN the *Smithsonian Miscellaneous Collections*, vol. xlix., Dr. A. G. Maddren has published a report of his expedition to Alaska last year in search of remains of the mammoth and other extinct mammals. The report contains a valuable description of the surface deposits of the country which will interest students of glacial geology, and there is an appendix of extracts from the published writings of Kotzebue, Beechey, and later travellers who have visited Alaska for a similar purpose. Dr. Maddren appears to have failed to obtain any important fossil bones, but his geological observations justify a few interesting conclusions. He thinks that the climate of the Arctic and sub-Arctic regions was never colder than it is at present. He is also convinced that there are no deposits of ice in Alaska which date back to the Pleistocene period, except the large glaciers. He has not observed any ice-beds interstratified with undoubted Pleistocene formations.

THE well preserved fossil ganoid fishes from the black Triassic shales of New Jersey, U.S.A., have long attracted attention. They are sometimes found in numbers so great as to excite public interest. The State geologist of New Jersey, in his last annual report (for 1904), has accordingly published a short account of these fossils, illustrated by photographs, and preceded by some elementary remarks on the study of fossil fishes in general. The chapter was prepared by Dr. Charles R. Eastman, and contains a useful summary of our knowledge of American Triassic fishes up to date. Notwithstanding the abundance of individuals, only six genera are represented—a curious contrast in this respect to any fish-fauna now existing. The species are also remarkably few, and some of them are difficult to distinguish on account of the crushing and distortion to which the fishes have been subjected during burial and fossilisation. Dr. Eastman does not describe any new forms.

THE Philippine Islands experienced a very destructive cyclone on September 26; the accounts that have hitherto reached us are rather meagre, and are extracted from the Manila *Cablenews* of September 28, which states that the storm was the worst that has occurred in the last twenty years. Some hundreds of houses were unroofed in Manila, where the wind is said to have reached a velocity of 103 miles an hour; at the naval station at Cavite damage was done to the extent of at least 100,000 dollars, but, so far as is known, the loss of life has not been very great. The Manila Observatory did good service in giving timely notice of the approach of the storm, notwithstanding that it was mostly dependent upon its own observations, as the telegraph lines in south-east Luzon were destroyed. The direction taken by the storm seems to have been from E.S.E. to W.N.W., and the rate of advance was about 12 miles an hour. The barometer fell from about 29·850 inches to 29·213 inches between 9h. p.m. of September 25 and 2h. p.m. of September 26; compared with the fall in our own latitudes, the amount, of course, is not excessive. The rainfall in twenty-four hours amounted to $4\frac{1}{4}$ inches.

PROF. J. HANN has made a very valuable addition to our knowledge of the meteorological conditions prevailing over the tropical regions of the earth by his publication of "Der tägliche Gang der Temperature in der inneren Tropenzone," which has been reprinted from the seventy-eighth volume of the "Denkschriften der mathematisch-naturwissenschaftlichen Klasse der kaiserlichen Akademie der Wissenschaften" (Vienna, 1905). In his introduction he states that the mean temperatures of several stations in the tropics have been placed too high on account of inaccurate determinations of corrections which were applied to compute the true means. The object of the present investigation is therefore to determine the mean temperatures more exactly, making full use of the latest observations, and to employ a greater number of stations well distributed in longitude which were not previously available. Further, the two previous researches by Dove were published more than half a century ago, and no such complete work has since been published. In the present investigation the observations at thirty-five stations are utilised, and these are distributed over Africa, West Indies, Central and South America, south Asia and north Australia, and tropical oceans. To refer, even at the shortest length, to the method of reduction, the numerous tables, and the details given regarding each station utilised would considerably extend this note, but those interested in the investigation should make themselves acquainted with the volume itself.

A VALUABLE paper by Mr. S. R. Williams on the anatomy of *Boophilus annulatus* (Say), the tick which transmits the Texas fever of cattle, is published in the *Proceedings of the Boston Society of Natural History*, vol. xxxviii., No. 8, p. 313.

MR. WATKINS-PITCHFORD, bacteriologist and analyst to the Government of Natal, has published some observations on the germicidal action of copper salts and of bright copper. He concludes that in cupric sulphate, in the proportion of 1 part to 75,000 parts of water, we possess an agent which promises to be both efficient and safe.

Le Radium for October (2e année, No. 10) contains articles by Sir W. Ramsay, on a new element, radiothorium; by M. Bloch, on the electric conductivity of selenium; by M. Charbonneau, on the transformation of currents of high tension into static discharges; and by M. Fraenkel, on the application of the X-rays in the study of the distribution of the blood vessels; together with the usual summary of researches connected with radio-activity. It is altogether an excellent number.

WE have received the second number of vol. i. of the Memoirs of the College of Science and Engineering, Kyoto Imperial University, containing reports on original work carried out by members of the university. The present number contains accounts of research in pure and physical chemistry, geology, engineering, and electricity.

THE *Psychological Review* (n.s., vol. xii., No. 5) contains an account, by Mabel S. Nelson, of an investigation of the difference between men and women in the recognition of colour and the perception of sound. As a result of many observations, the conclusion is formed that men are clearly superior in the recognition of blue and women possibly superior in the recognition of yellow. Both men and women hear farther with the right than with the left ear, men hearing better than women.

RECENT American mathematical journals contain some interesting papers. In the *Transactions of the American Mathematical Society* for July 10 M. Poincaré gives a

characteristic discussion of the geodesic lines on convex surfaces, with the aim of illustrating by a comparatively simple case the difficult questions of dynamic stability and instability in the problem of three bodies. Prof. E. W. Brown investigates a general method for treating transmitted motions and indirect perturbations such as arise when the action of the earth on the moon is modified by the influence of a planet on the earth's motion. In a long paper on the relation of the principles of logic to the foundations of geometry, Prof. J. Royce directs attention to a former paper by Mr. Kempe, which seems to have been largely neglected, and proceeds to develop the logical consequences of a theory suggested by, but more general than, Kempe's theory. Prof. Bromwich gives the classification of quadrics in hyperbolic and elliptic space, Prof. J. E. Wright writes on differential invariants, and Prof. Pierpont on multiple integrals. The remaining papers, by Messrs. Neikirk, Miller, Dickson, and Wedderburn, are all short, and bear upon the theories of groups and numbers.—In the July number of the *Annals of Mathematics* Dr. E. V. Huntington begins a series of articles on the continuum as a type of order, being a systematic elementary account of the modern theory, put together for the sake, not only of the mathematical student, but of non-mathematical students of scientific method; and Prof. Dickson proves a theorem in the theory of groups and applies it to the discussion of the real elements of certain classes of geometrical configurations.—The *Bulletin of the American Mathematical Society* gives in full a translation of M. Darboux's survey of the development of geometrical methods, the address delivered by him at the St. Louis International Congress of Arts and Sciences. In a short note Dr. Morehead proves that $F_n=2^{2n}+1$ is not a prime when $n=7$, and states that he is in possession of a method for testing other similar cases. The only cases known to be primes are the first four, proved to be so by Fermat.

IN a paper published in the *Sitzungsberichte* of the Vienna Academy of Sciences (vol. cxiv. p. 553), F. von Lerch describes an experimental investigation of the electrochemical behaviour of thorium X, particularly as regards the manner in which it differs from the "induced activity" of thorium. When thorium X is dissolved in hydrochloric acid, and different metals are immersed in the slightly acid solution, the active substance which separates on the metal is not thorium X, but the induced activity; the same holds true of the product separated from the acid solution by electrolysis. On the other hand, from a solution of thorium X made alkaline with caustic potash or ammonia, thorium X is usually deposited either by a metal or under the influence of an electric current; but in certain cases, for example with amalgamated zinc, the induced activity is also thrown down. The production of thorium A and thorium B, and the relation existing between them, is also discussed.

IN vol. ix., p. 441, of the *Journal of Physical Chemistry* Messrs. E. S. Shepherd and G. R. Upton discuss the tensile strength of copper-tin alloys in relation to their chemical and physical structure. The test pieces made use of were heated for a prolonged period at different temperatures in order fully to attain the crystalline structure normal to those temperatures, the heating being followed by fixation of the properties by control of the rate of cooling. Among other results, it was found that prolonged annealing tends to coarsen the crystalline structure, to decrease the tensile strength, and to increase the ductility. In a second paper Mr. E. S. Shepherd gives an account of investigations of aluminium-zinc alloys, from which it is concluded that these series of alloys present no so-called definite compounds. There are, however, two series of solid solutions, that of zinc in aluminium and that of aluminium in zinc.

WE have received the annual address of the retiring president of the Society of Public Analysts, reprinted from the *Analyst* of April of this year. In the course of his address, Mr. Fairley referred particularly to the necessity that exists for a properly constituted authority to supervise the standard for drugs. In "Notes on the History of Distilled Spirits," published in the *Analyst* for September, Mr. Fairley includes an interesting collection of illustrations of ancient forms of stills used in several countries. The manufacture of whiskey was a matter of common knowledge amongst the people of Ireland when their country was invaded by the English in 1170–2, its Celtic name being "uisque beatha," meaning water of life. The distillation of brandy began to take form in France as a manufacturing industry early in the fourteenth century. Originally known as brandwine, brandewine, or brandywine, the term brandy came into use about 1657.

WE have received the first part of a "Natural History of the British Butterflies, their World-wide Variation and Geographical Distribution," by Mr. J. W. Tutt. The work is being published by Mr. Elliot Stock at 1*s.* net per part.

MR. R. W. ROBINSON has prepared a revised edition of "The Photographic Studio and what to do in it" by his father, the late Mr. H. P. Robinson (London: Iliffe and Sons, Ltd., price 2*s.* 6*d.* net). Few changes have been made, but references to some matters now out of date have been omitted. Amateur as well as professional photographers who wish to know something of the poses and practice of good portraiture will find Mr. Robinson's book a useful guide.

A SECOND edition of "Thermodynamique," by M. G. Lippmann, has been published in Paris by M. A. Hermann. The edition has been edited by MM. A. Mathias and A. Renault. The author endeavours first to elucidate the principles of thermodynamics in such a way that they may be applied intelligently. The facts upon which the principles rest are then explained. The general method of treatment adopted will enable the student to apply the principles of thermodynamics to particular cases, and thus render it unnecessary to search in a book for the right equation to use.

FIVE parts of a work on the fauna of New England, to be included in the occasional papers of the Boston Society of Natural History, have been received. The society is able to print this work by the aid of the proceeds of the Gordon Saltonstall fund. The first part is a list of the Reptilia, by Mr. Samuel Henshaw; the second of the Batrachia, by the same authority; the third is by Mr. Glover M. Allen, and deals with the Mammalia; the fourth, by Mr. Hubert L. Clark, is concerned with the Echinodermata; and the fifth is a list of the Crustacea, by Miss (or Mrs.) Mary J. Rathbun. When the series of lists is complete we hope to review them in these columns. Parts are to be published at irregular intervals, and though the details of the several lists will vary somewhat in the different groups, each list is to include, first, the accepted name (scientific and vernacular); second, reference to the original description, with record of locality; third, reference to an authentic description and illustration; and fourth, habitat and occurrence.

AMERICAN palæontologists are becoming more and more strongly convinced of the decisive character of the evidence afforded by extinct faunas of a comparatively recent con-

nection between South America, South Africa, and Australia. A short time ago, Dr. W. B. Scott, in the report of the results of the Princeton Expedition to Patagonia, announced his opinion that the fossil Santa Cruz insectivore Necrolestes is closely allied to the South African Chrysochloris, and that this relationship indicated a connection between South Africa and South America. Now Mr. W. J. Sinclair, of Princeton, in a paper published in the *Proceedings of the American Philosophical Society*, states unequivocally that Prothylacinus and the other marsupial-like carnivores of the Santa Cruz beds are true marsupials closely related to the Australian thylacine. He is, moreover, of opinion that the living South American marsupial Cœnolestes and its extinct relatives are annectant forms between diprotodonts and polyprotodonts, and are also not far removed from the ancestral stock which gave rise to the Australian phalangers. The existence of primitive opossums which cannot be regarded as ancestral to the modern South American forms is also an important determination. In view of the aforesaid relations, coupled with the evidence afforded by the invertebrate faunas, Mr. Sinclair considers himself justified in stating that "considerable evidence is now available to show that a land connection between Patagonia and the Australian region existed not later than the close of the Cretaceous or the beginning of the Tertiary, and it is possible that at this time the interchange of marsupials between the two continents was effected."

THE Carnegie Institution of Washington has published the first part of vol. i. of a "Bibliographical Index of North American Fungi," by Prof. William G. Farlow, professor of cryptogamic botany in Harvard University. This part extends from Abrothallus to Badhamia. The index owes its origin to the fact that in 1874 Prof. Farlow found it impossible to ascertain what species of fungi were known to occur in the United States, and he determined to bring together all references to North American species in the form of a card index. At the same time an authors' catalogue was started to include the titles of all works used in forming the catalogue of species. The latter catalogue was printed in 1887, and was followed by a supplemental list in 1888. A new edition with additions up to 1905 is in preparation. It was found impossible to obtain means of publication for the index until the Carnegie Institution offered to provide the funds. It is expected that the appearance of the present index will save many American institutions much time and money involved in the duplication of work. The index does not pretend to be a summary of all references to North American fungi, but is limited to those which concern the systematic mycologist, and does not include references to papers on fungicides and other technical subjects. We hope to review the index when its publication has been completed.

THE eleventh volume of the new series of the *Reliquary and Illustrated Archaeologist*, containing the four quarterly numbers published in 1905, is now available. Among contributions which will appeal to men of science are Mr. George Clinch's papers on the Neolithic dwelling and on Neolithic burial, Mr. John Patrick's essays on the sculptured caves of East Wemyss, and Mr. W. Heneage Legge's paper on glimpses of ancient agriculture and its survivals to-day. The journal makes a successful appeal to all who are interested in antiquities, architecture, the arts and industries of man in past ages, and in kindred subjects.

THE eighth volume of the *Transactions of the Rochdale Literary and Scientific Society*, dealing with the years 1903–5, has now been published. Among papers read before the society and printed in the volume the following may be mentioned:—Mr. T. Stenhouse, on the radio-activity of radium and other compounds; Mr. W. A. Parker, on the remains of fossil fishes found near Rochdale; Mr. W. H. Sutcliffe, on the bullion mine of the Upper Carboniferous rocks; Mr. C. W. R. Royds, on life in Antarctica; Mr. W. Baldwin, on the palæontology of Sparth Bottoms, Rochdale; and Mr. W. H. Pennington, on some ancient colouring matters. The latest report contained in the volume shows that the total number of members at the end of 1904 was 249, and that the society had a balance of about 66*l.* in hand. The society is to be congratulated upon its continued activity and upon the way in which, by lectures, field excursions, and other methods, it is disseminating an interest in scientific subjects.

OUR ASTRONOMICAL COLUMN.

A SUGGESTION FOR THE NEXT INTERNATIONAL SCHEME.—As the work on the international chart of the heavens is now nearing completion, Mr. W. E. Cooke, of the Perth (W. Australia) Observatory, suggests that astronomers should now begin to consider the next essential astronomical problem which should be attacked internationally. He suggests that the coordination of meridian observations is desirable, and outlines the plans on which such work might be commenced. These include the observation of fundamental stars, of about the sixth magnitude, in every part of the sky, and the formation of a main catalogue comprising, say, three stars to each square degree of the sky, that is, about 120,000 stars altogether. The accomplishment of this work would not only provide the necessary reference stars for future observations, but would give definite meridian work to a number of observatories which at present are performing it in a casual manner and often overlap each other's programmes (*Monthly Notices R.A.S.*, No. 9, vol. lxv.).

PHŒBE, THE NINTH SATELLITE OF SATURN.—Further details concerning the discovery and recognition of Saturn's ninth satellite are published by Prof. W. H. Pickering in No. 5, vol. liii., of the *Harvard College Observatory Annals*.

Prof. Pickering describes the taking and the reduction of each of the numerous plates on which the position of Phœbe has been measured. Up to the commencement of the present year 105 plates of Saturn had been secured with the Bruce telescope, and Phœbe had been recognised on 72 of these, the image on 69 of them being sufficiently well defined to be accurately measured.

On comparing these plates with others which were taken by Prof. Perrine with the Crossley reflector, it is seen that with plates having had equal exposures, and on which Phœbe is seen equally well, those taken with the reflector show stars of about one magnitude fainter than any to be found on the Bruce refractor plates.

Recent observations give the period of Phœbe as about 547·5 days, and the comparison of the observational results with the different sets of elements shows that with the revised elements the deviations are much smaller.

In No. 6 of the same volume Dr. F. E. Ross shows, in detail, the procedure followed in calculating the elements of Phœbe, and compares the three sets of elements which have been computed with the observational results. The discussion shows that slight changes in the previously determined eccentricity and period will bring the plates secured during 1898 into line with the more recent observations.

GRAPHICAL METHOD OF DETERMINING ALTITUDES AND AZIMUTHS.—A simple method of finding the altitude and azimuth of an observed body, the latitude of the observer and the declination and hour-angle of the object being known, has been devised by Mr. Littlehales, of the U.S. Hydrographic Office, and is briefly described in No. 6, vol. xxxiii., of the *Monthly Weather Review* of the U.S. Department of Agriculture.

The plan of solution employs a stereographic projection of the celestial sphere on the *plane of the observer's*